

Appendix P

Adjacent to Surface Water Dilution Analysis

An analysis of the effects of the proposed drainfield system on the quality of any adjacent surface water is required (ARM 17.36.312). The increase in the nitrate concentration in the surface water cannot exceed the trigger value (T.V.) of 0.01mg/L and the increase in the phosphorous concentration cannot exceed the trigger value (T.V.) of 0.001 mg/L as set forth in WQB 7 (ARM 17.30.715 (1)(c)).

Dilution Equation:

$$\frac{(Q_D)(C_D) + (Q_L)(C_L)}{Q_D + Q_L} < T.V. = \text{non-significant}$$

Q_D = Effluent flow rate from drainfield (200 gpd or 26.7 ft³/d per single-family home between 2 and 5 bedrooms)

C_D = Nitrate concentration (50 mg/L for conventional or 24 mg/L for Level 2) or phosphorous concentration (10.6 mg/L) in effluent

Q_L = Flow rate into (or out of) surface water determined by stream gauge (usually the 7-day, 10-year low flow; 7Q₁₀) or ground-water flow (Darcy's Law – see Appendix R)

C_L = Nitrate or phosphorous concentration in surface water (can typically assume zero since increase, not total, is important)

Darcy's Law: $Q = KiA$

Q = ground-water flow (volumetric rate in ft³/d)

K = hydraulic conductivity (ft/d)

i = hydraulic gradient (ft/ft)

A = area through which ground water flows (ft²)